**3.3 – Net Ionic Equations**

* In many ionic reactions, not all of the chemical species undergo a change.
* Those that do not change are called spectator ions.
* When we remove these spectator ions from a chemical equation, they produce what is called a net ionic equation.
* These indicate only the substances that undergo a change.

**Writing Net Ionic Equations**

Use the following 3 steps when writing net ionic equations:

1. Balance the equation for atoms.
2. Write out the dissolved chemical species as they exist in solution. Precipitates, liquids and gases are not written as ions. This is called a total ionic equation.
3. Remove common aqueous ions (ions that are in both the reactant and product). The resulting equation is then the net ionic equation.

**An Example…**

A solution of barium chloride combines with a solution of sodium carbonate to form a precipitate of barium carbonate and a solution of sodium chloride.

So…

barium chloride + sodium carbonate 🡪 barium carbonate + sodium chloride

BaCl2(aq) + Na2CO3(aq) 🡪 BaCO3(s) + NaCl(aq)

Now, we have something we can work with.

**Step 1: Balance the equation for atoms.**

BaCl2(aq) + Na2CO3(aq) 🡪 BaCO3(s) + 2NaCl(aq)

**Step 2: Write out the dissolved chemical species as they exist in solution.**

BaCl2(aq) + Na2CO3(aq) 🡪 BaCO3(s) + NaCl(aq)

becomes…

Ba2+(aq) + 2Cl-(aq) + 2Na+(aq) + CO32-(aq) 🡪 BaCO3(s) + 2Na+(aq) + 2Cl-(aq)

**Step 3: Remove common aqueous ions.**

Ba2+(aq) + 2Cl-(aq) + 2Na+(aq) + CO32-(aq) 🡪 BaCO3(s) + 2Na+(aq) + 2Cl-(aq)

becomes…

Ba2+(aq) + CO32-(aq) 🡪 BaCO3(s)  (net ionic equation)

**A couple things to watch for…**

* You will notice that in your net ionic equations, the number of atoms should be balanced, as well as the charge.
* In our example, we had 1 Ba, 1 C, and 3 O on both sides of the net ionic equation, and the charges (-2 and +2) also balanced.
* Number of atoms should remain constant as well. For example, if you were doing step 2 for something involving 2CaCl2, the dissociation would look like this:

2Ca+(aq) + 4Cl-(aq)